

sharpshins and tissue samples from road and window-killed birds for organochlorines, PCBs, and heavy metals. Results from these analyses showed elevated levels of DDE in some adult carcasses. In addition, the average blood level found in adult birds has been shown to correspond to significantly elevated levels of DDE in Sharp-shinned Hawk eggs.

RESTORING OSPREY TO METROPOLITAN LAKES IN THE TWIN CITIES, MINNESOTA

VOIGHT-ENGLUND, J., M. MARTELL, H. TORDOFF AND P.T. REDIG. *The Raptor Center at the University of Minnesota, 1920 Fitch Ave., St. Paul, MN 55108*

Ospreys historically nested throughout the wooded portion of Minnesota, including the Twin Cities area. They were eliminated as a nesting species in the southern two-thirds of the state before the turn of the century, primarily due to uncontrolled shooting. Ospreys have been successfully reintroduced to portions of their former range in Minnesota through hacking programs. In 1992, a three-year program was initiated to return Osprey as a nesting species to lakes within the metropolitan area, as well as to provide city residents and visitors with the exciting opportunity to see Ospreys at close range. Hack towers were erected at two metropolitan lakes. Osprey chicks were translocated from nests in northcentral Minnesota to metropolitan hack boxes at 5½–7 weeks of age. Birds were released when they reached flight stage. A corps of volunteers (over 75 at the two sites) was enlisted to monitor the fledglings from dawn until dusk for 4 weeks after their release. Ospreys learn to fly and fish without adult supervision. The Twin Cities Ospreys have become tolerant of human activity, including canoeing and walking adjacent to the hack box. The birds use perches in areas of moderate human activity as well as perches in more secluded areas. They fish adjacent to canoes and sailboards. One of the more impressive results of this year's reintroduction was the high degree of interest exhibited by park users. Almost half of the persons visiting the monitoring stations had no previous knowledge of Ospreys and they were extremely enthusiastic about the project after viewing the birds through the monitor's spotted scope. Reintroducing Ospreys to a metropolitan area is an effective method of restoring an ecosystem, as well as educating the general public about raptors, wildlife, general ecological principles, and the human role in natural resources conservation.

USE OF RAPTORS IN MONITORING ECOLOGICAL INTEGRITY OF TROPICAL FOREST RESERVES

WHITACRE, D. *The Peregrine Fund, Inc., 5666 W. Flying Hawk Lane, Boise, ID 83709*. A.J. BAKER. *P.O. Box 2492, Gig Harbor, WA 98335*. I. CORDOVA M. *Parque Nacional Tikal, Petén, Guatemala*. P.M. HARRIS. *4019 Ashworth N., Seattle, WA 98103*. A.E. HERNÁNDEZ C. *Parque Na-*

cional Tikal, Petén, Guatemala. L.E. JONES. *22583 Veronica Dr., Salinas, CA 93908*. C. MATEO M. *Parque Nacional Tikal, Petén, Guatemala*. J. SUTTER. *22583 Veronica Dr., Salinas, CA 93908*. C. SWARTZ. *1205 Thousand Springs Grade, Wendell, ID 83355*. C.W. TURLEY. *120 S. 24th Street, Mount Vernon, WA 98273*. R. VILLEGAS P. *Apartado Postal 579, Xalapa, Veracruz, Mexico*

To achieve effective conservation within protected areas, it is important to monitor biological diversity and ecological integrity of these areas. Over the past five years, Peregrine Fund researchers have developed methods for monitoring ecological integrity of tropical forest areas, using diurnal and nocturnal raptors and selected other bird and mammal species as ecological indicators. The "Maya Project" uses a suite of census techniques to monitor ecological health of the largest area of contiguous protected lowland forest in Central America—the Maya/Calakmul/Rio Bravo biosphere reserve complex and surroundings, in Guatemala, Belize, and Mexico. At each site, 10 canopy-emergent census points (trees, Mayan temples) are used, with a combination of three census methods. A pre-dawn listening census reveals *Micrastur* spp., owls, nightjars, tinamous, primates, and other species. A mid-morning visual/aural census above the canopy reveals most diurnal raptors, as well as pigeons, doves, and parrots. These methods are supplemented by acoustical luring using distressed prey vocalizations, to increase detection rates of a few cryptic or rare species (Bicolored Hawk, Crested Eagle). These techniques yield various indices of detection rate and relative abundance which can be used to compare habitats or detect change over time. Methods are described, along with pitfalls and practical hints. Results are presented for three areas censused during two years. Differences in raptor communities among the three sites are clearly demonstrated. This suite of methods is a low-tech, flexible, and highly replicable approach to inventory and monitoring of raptors and other potential indicator species in tropical forests. Current rates of tropical forest destruction, degradation, and fragmentation argue for the widespread installation of programs for monitoring biological diversity and ecological integrity. The methods described here should be easily adapted to other sites throughout the world and can play an important role in establishment of effective monitoring programs.

POST-FLEDGING ECOLOGY OF IMMATURE BALD EAGLES. MOVEMENTS, TIMING OF MIGRATION, AND SURVIVAL

WOOD, P.B. *West Virginia Cooperative Fish and Wildlife Research Unit, P.O. Box 6125, Percival Hall, West Virginia University, Morgantown, WV 26506-6125*

Little was known about the post-fledging movements and habitat use of fledgling bald eagles prior to their first migration. Timing of initial migration and factors that influence it also were not well understood. I used a two-fold approach to address these questions. I collected ex-